Session 12, Presentation 4; authors email: stephen.c.whelan@ucd.ie

The effect of forage source and supplementary methionine hydroxy analogue on rumen fermentation parameters

S.J. Whelan, F.J. Mulligan, J.J. Callan, B. Flynn and K.M. Pierce
UCD School of Agriculture, Food Science and Veterinary Medicine
Lyons Research Farm, Newcastle, Dublin, Ireland

Department of Agriculture, Fisheries and Food
An Roinn Talmhaíochta, Iascaigh agus Bia

UCD DUBLIN

Introduction

- Provides nutrients to the animal
  - Energy through VFA
  - Protein through microbial biomass
  - Key vitamins and fatty acids
- Therefore…
- It is important as nutritionists to know what is happening in the rumen with different dietary strategies

Introduction

- Key focus in recent years on nutrition and the environment

- Strategies such as
  - Reducing dietary CP
  - Altering the forage source offered
  - Offering supplementary AA
- … have been explored with the aim of reducing N excretion
- However, very few studies examine the effects of these strategies on rumen physiology

Objective of the Experiment

To evaluate the effects of offering either grass silage or maize silage with or without a supplementary methionine hydroxy analogue on rumen fermentation parameters in lactating dairy cows offered a low crude protein diet

Materials and Methods

- 2*2 factorial Latin square design
- 4 diets 4 periods
- 1 animal per diet per period
- Animals were housed in metabolic stalls
- 3 day stall adjustment period followed by…
- Rumen sampling every 2 hours for 48 hours for…
  - pH, VFA, lactic acid and NH_3N concentrations

Dietary Treatments

- All diets were fed as total mixed rations once daily
- 4 diets
  - GS based TMR (GS-)
  - GS based TMR + HMBi (GS+)
  - MS based TMR (MS-)
  - MS based TMR + HMBi (MS+)
- Iso-energetic and iso-nitrogenous
- Met UFL and PDI requirements for production

Dietary Ingredients

	GS-	GS+	MS-	MS+
Ingredients (g kg DM^{-1})				
Grass Silage	460	460	120	120
Maize Silage	100	100	520	520
Barley Straw	0	0	20	20
Rolled Barley	210	210	80	80
Sugar Beet Pulp	130	130	120	120
Soybean	90	90	130	130
HMBi[1]	0	2.1	0	2.1
Calcium	0	0	4.7	4.7
Minerals / Vitamins	10	10	10	10
Grass : Maize	82 : 18	82 : 18	18 : 82	18 : 82
Forage : Concentrate	56 : 44	56 :44	64 : 36	64 : 36

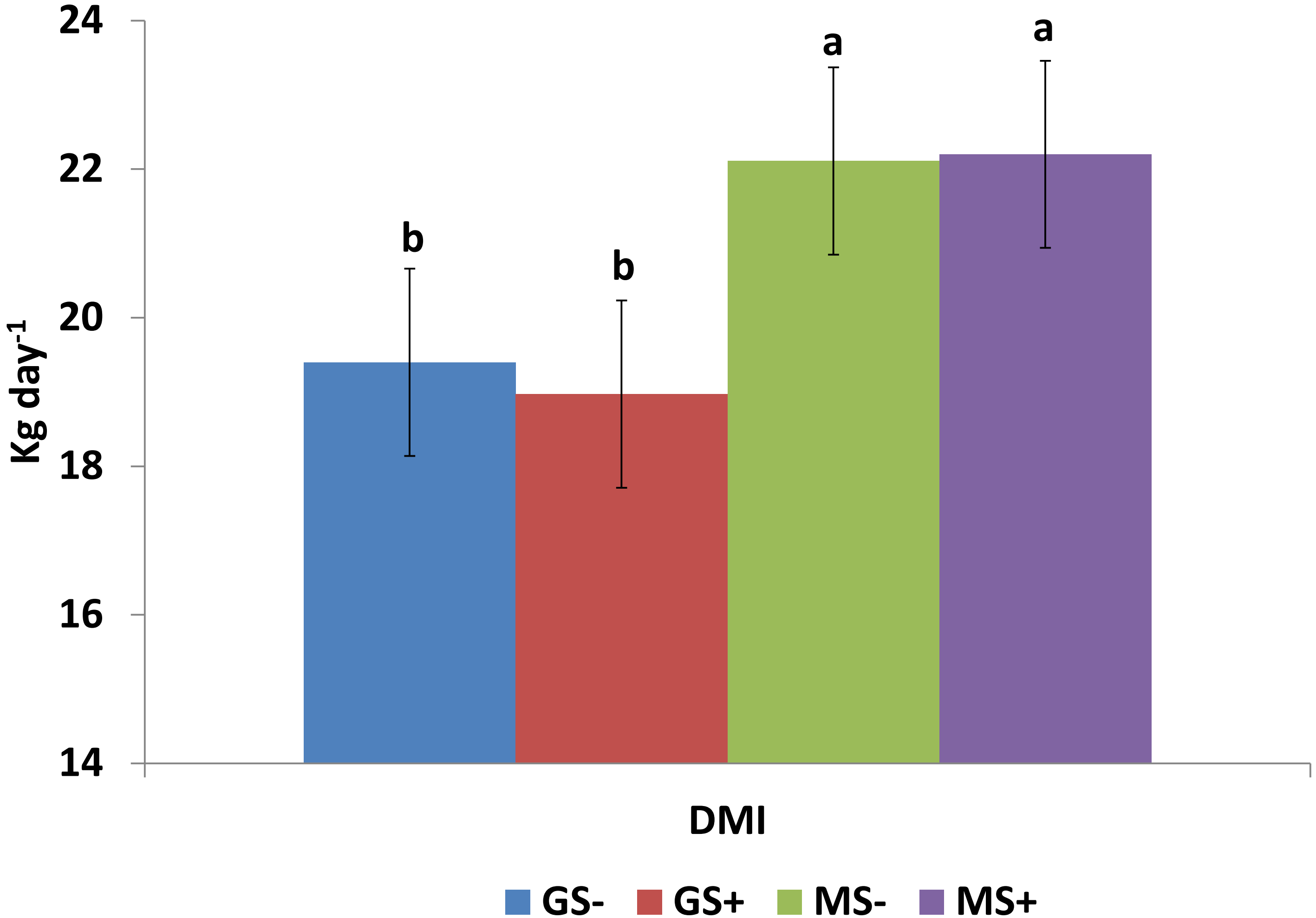
[1]HMBi= isopropyl ester of 2-hydroxy-4-methylthio butanoic acid (Metasmart® Dry)

Dietary Composition

	GS-	GS+	MS-	MS+
DM *(g kg^{-1})*	363	365	400	410
Energy *(UFL kg DM^{-1})*	0.96	0.95	0.97	0.97
Composition *(g kg DM^{-1})*				
DMD	739	737	739	733
CP	132	132	133	134
Starch	146	147	178	177
NDF	500	514	591	583
ADF	216	205	223	229
Ash	64	62	60	58
PDIN	94	95	100	101
PDIE	96	97	100	101
PDIA	44	46	49	50

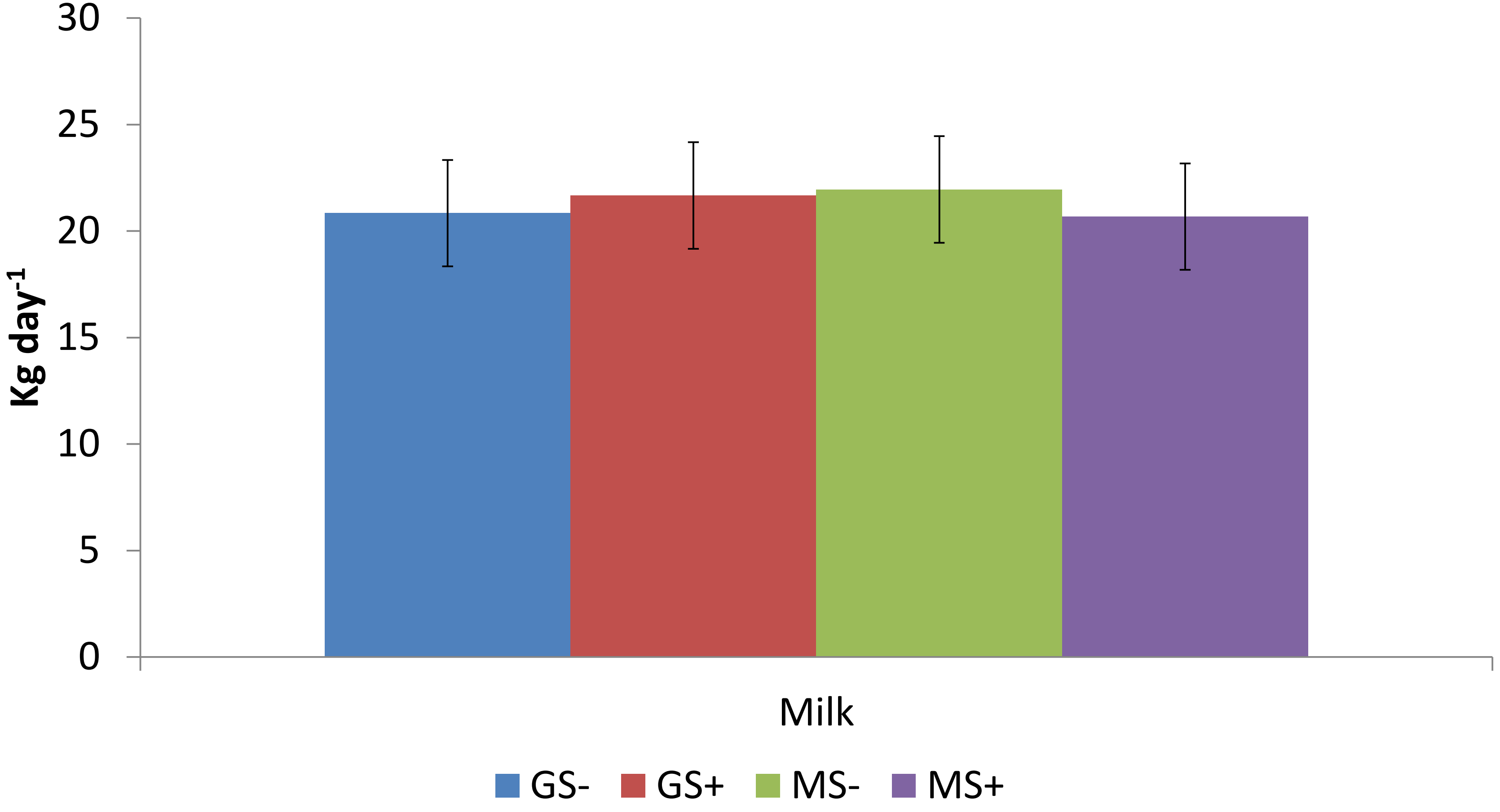
Results

Dry Matter Intake



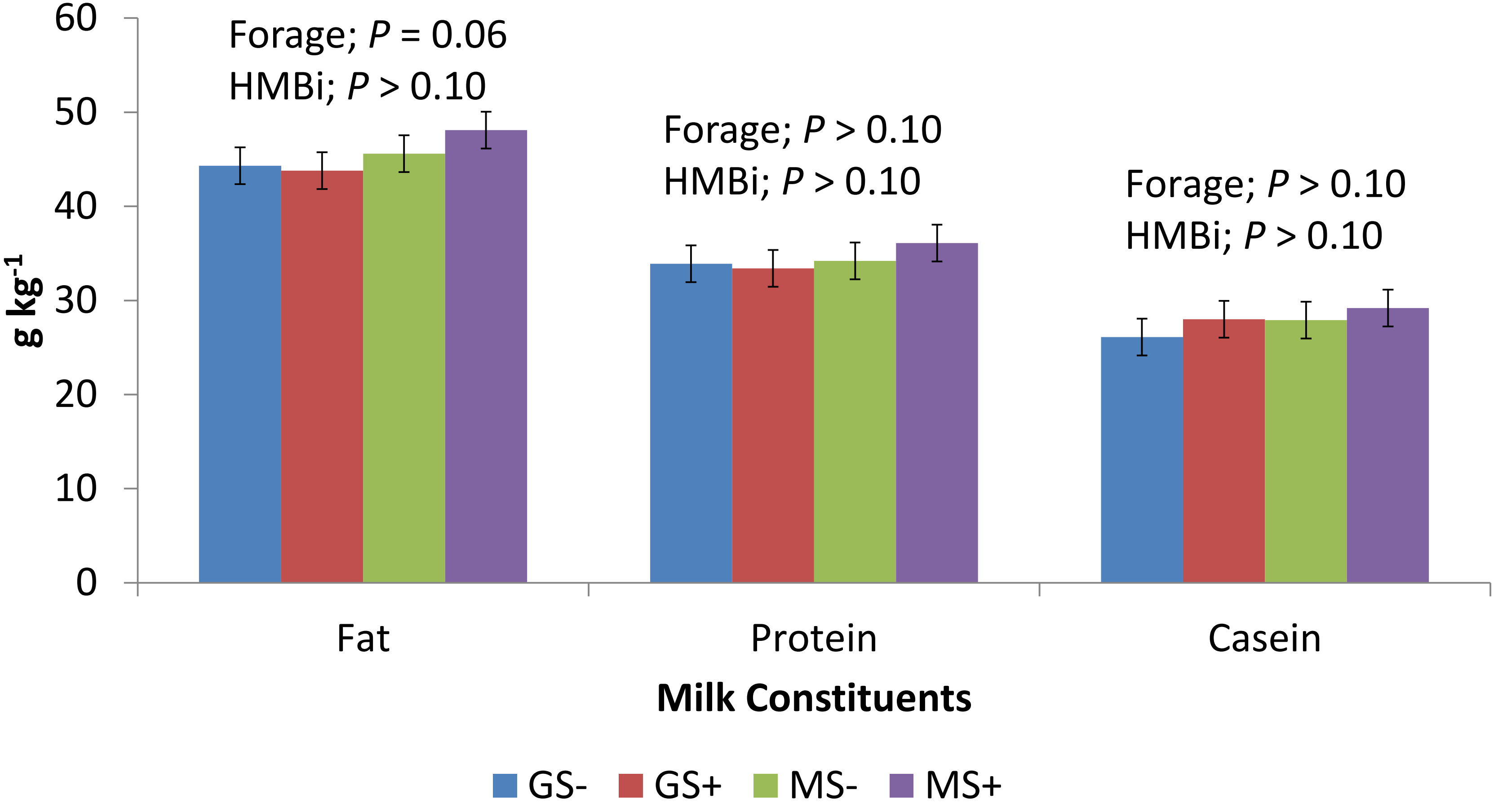
Forage P = 0.03, HMBi P > 0.10, Forage*HMBi P > 0.10, ab P < 0.05

Milk Yield

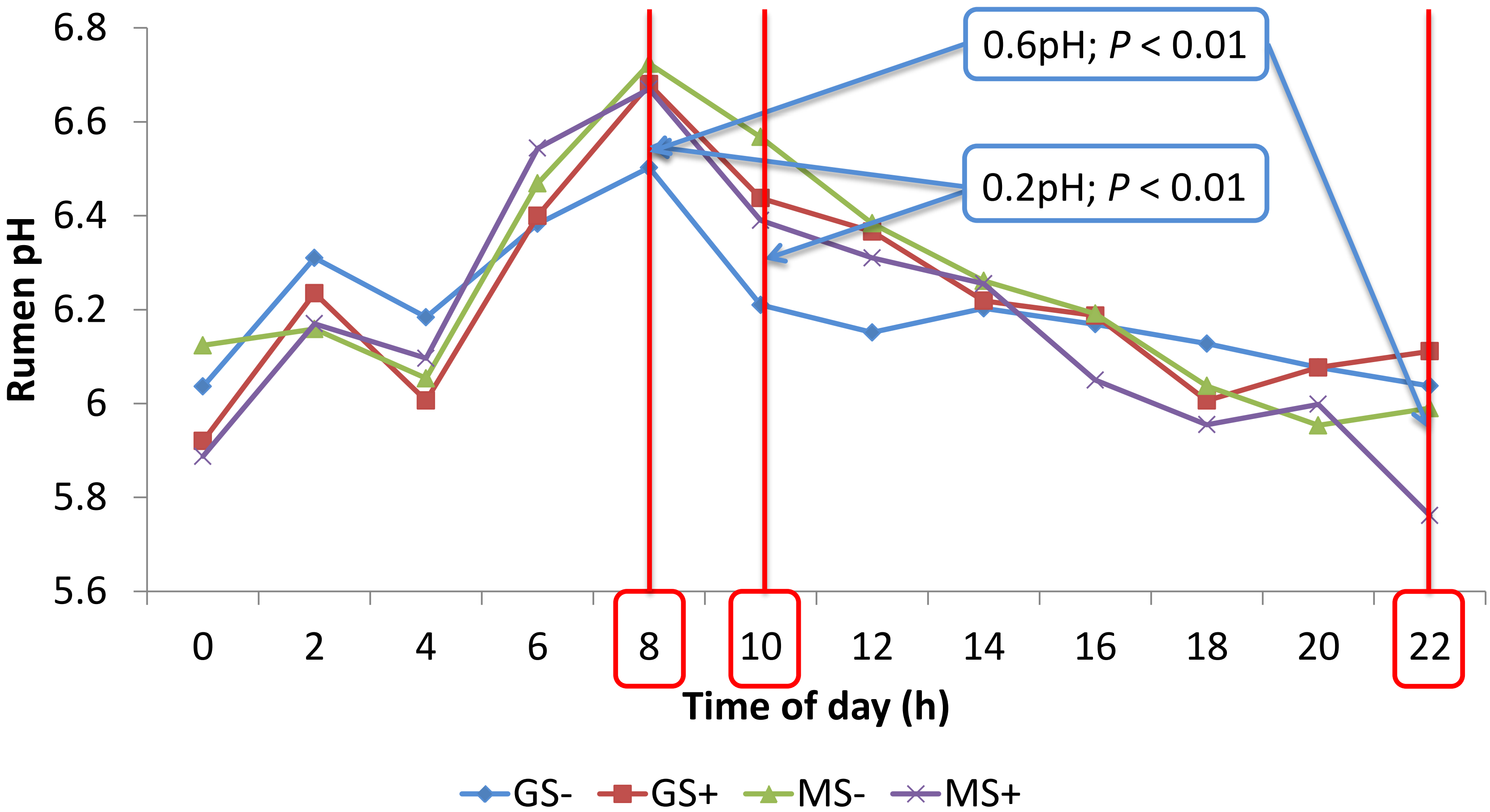


Forage *P* > 0.10, HMBi *P* > 0.10, Forage*HMBi *P* > 0.10

Milk Constituents

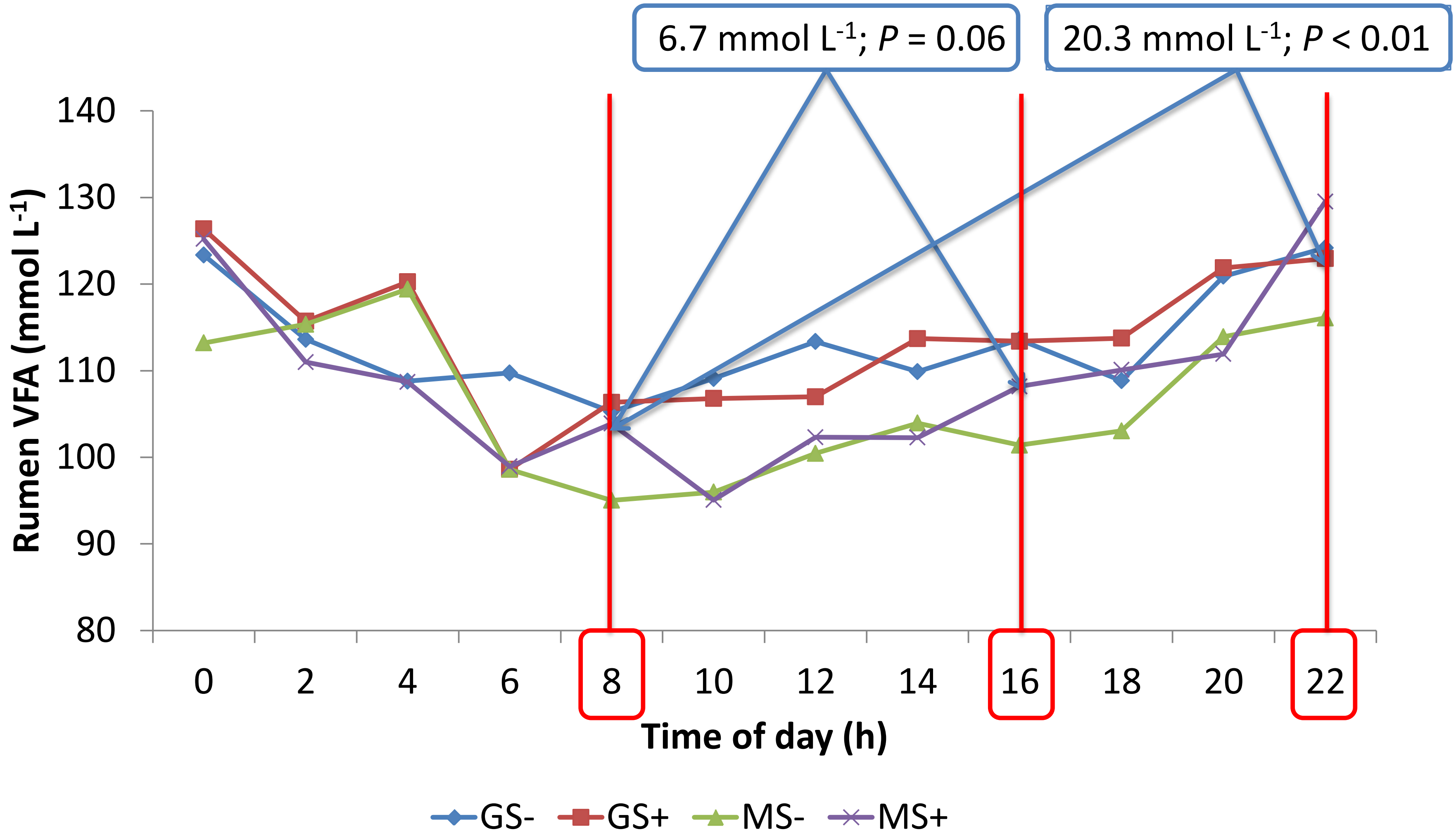


Diurnal pH



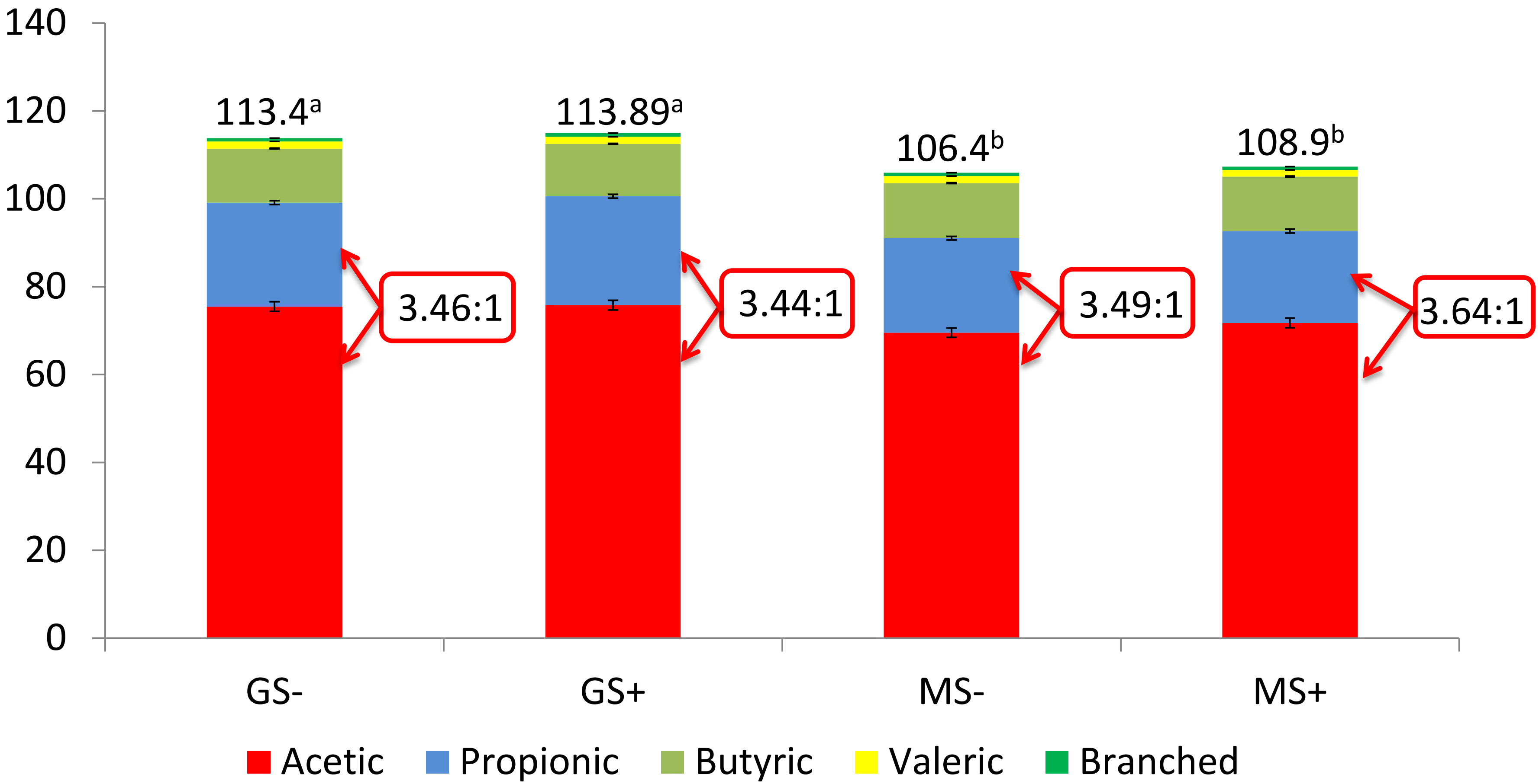
Forage $P > 0.10$, HMBi $P > 0.10$, Forage*HMBi $P > 0.10$, Time $P < 0.01$

Diurnal VFA Concentration



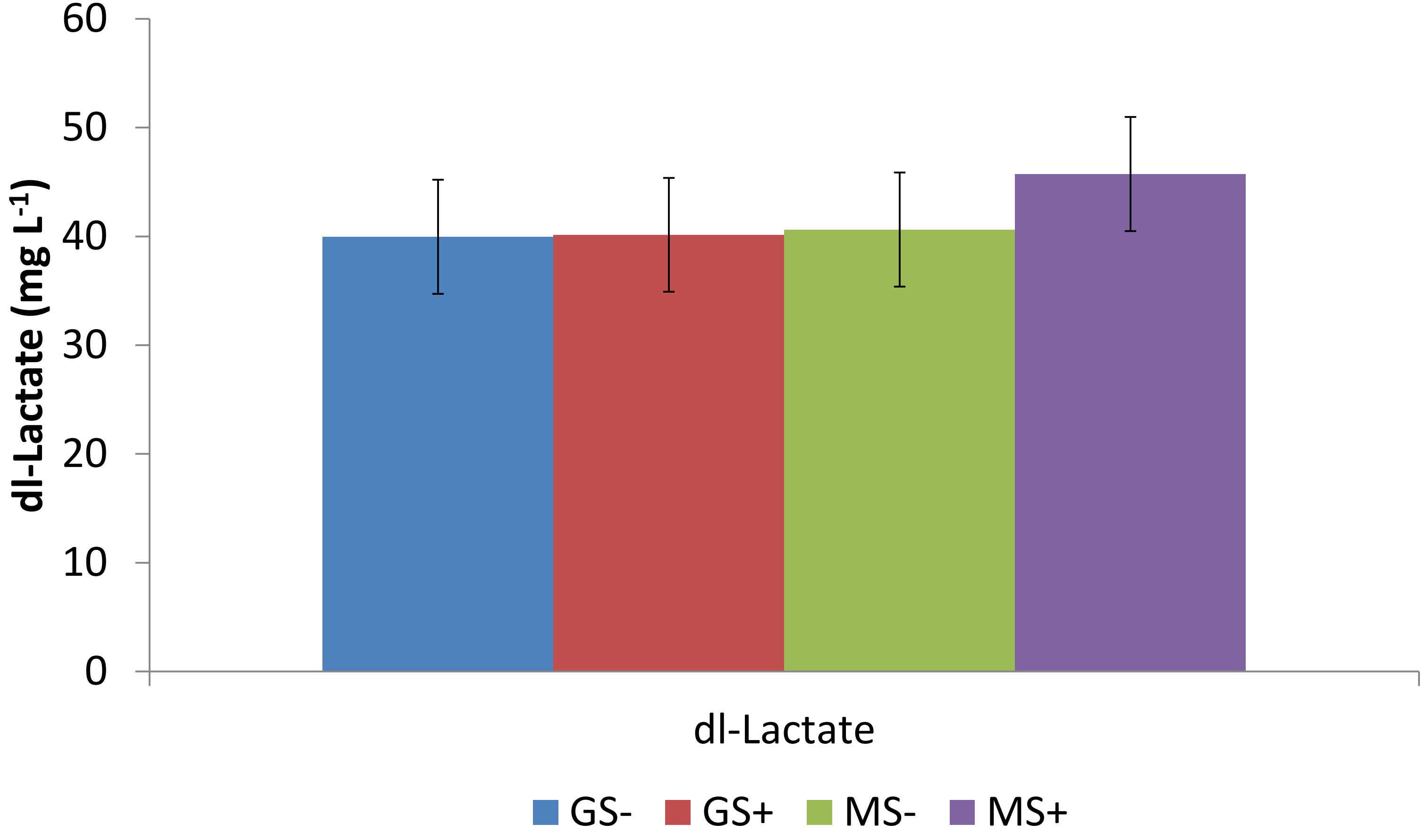
Forage $P < 0.01$, HMBi $P > 0.10$, Forage*HMBi $P > 0.10$, Time $P < 0.01$

Mean VFA Concentration



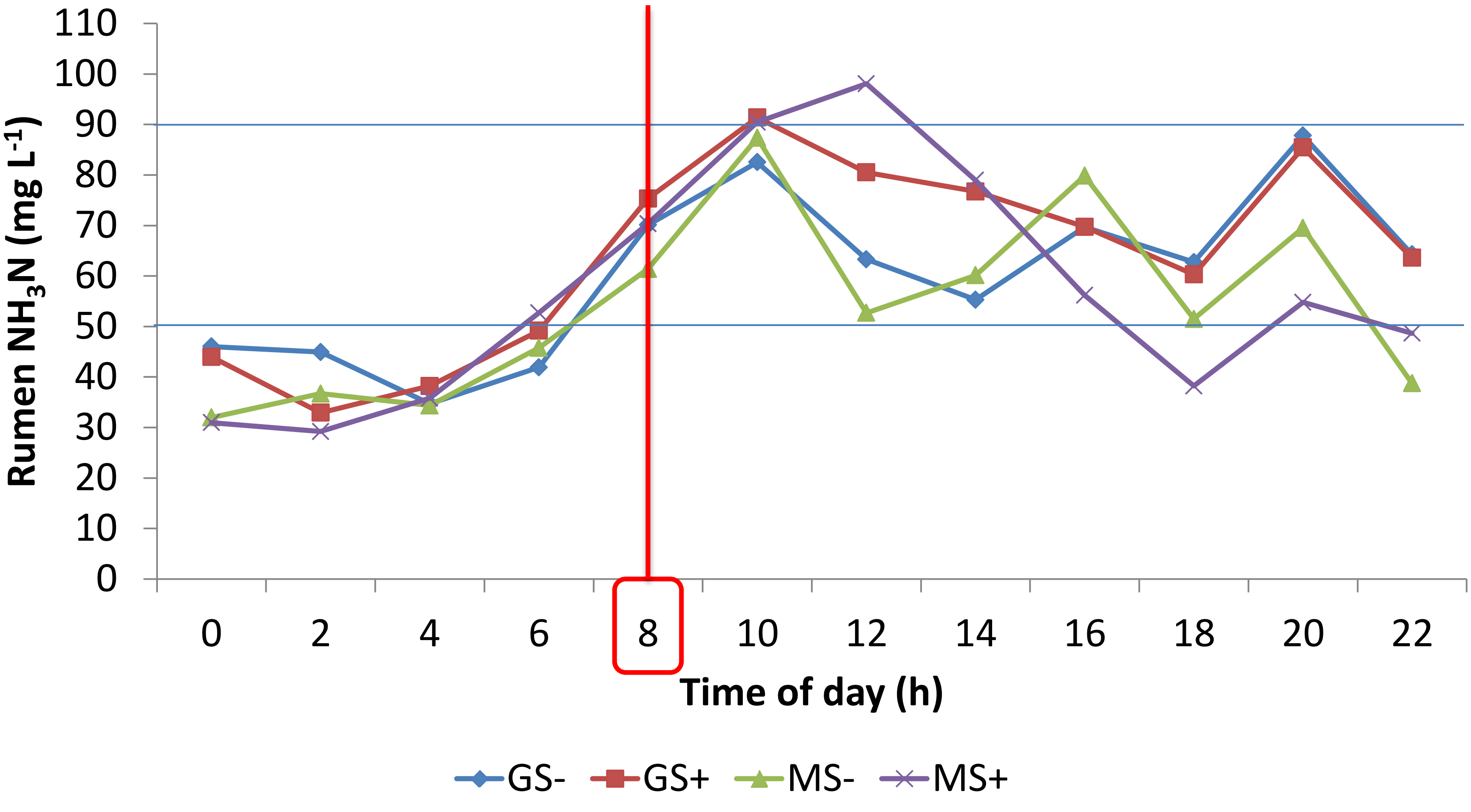
Forage $P < 0.01$, HMBi $P > 0.10$, Forage*HMBi $P > 0.10$, ab $P < 0.01$

Mean dl-Lactate Concentration



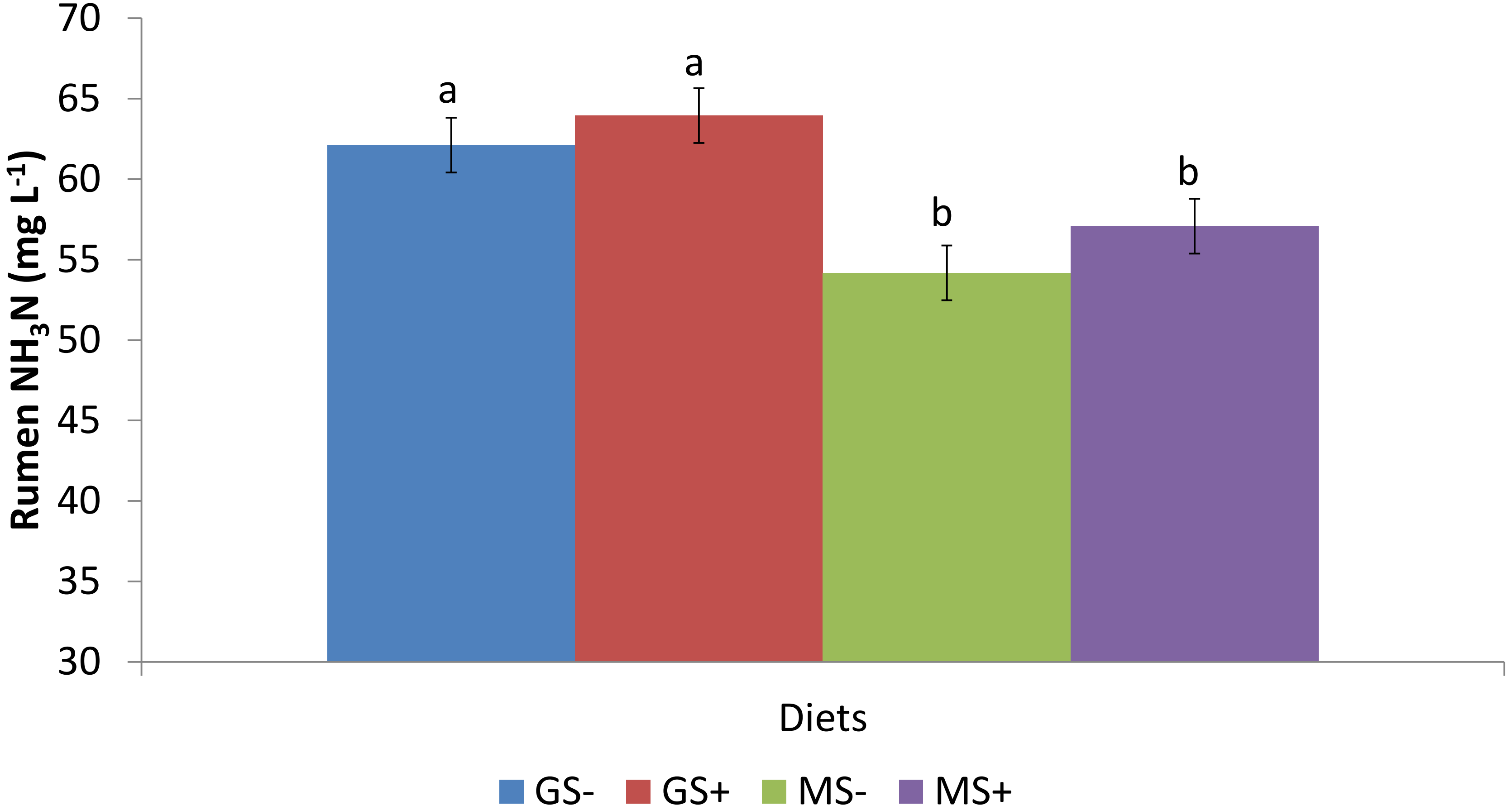
Forage $P > 0.10$, HMBi $P > 0.10$, Forage*HMBi $P > 0.10$

Diurnal NH_3N Concentration



Forage *P* < 0.01, HMBi *P* > 0.10, Forage*HMBi *P* > 0.10, Time *P* < 0.01

Mean NH_3N Concentration



Forage $P < 0.01$, HMBi $P > 0.10$, Forage*HMBi $P > 0.10$, ab $P < 0.01$

Conclusions

- Animals offered Maize Silage had a greater DMI vs. Grass Silage
- However…
  - Milk and Milk Constituents were not different
- Reduction in pH was related to an increase in VFA
- Grass Silage had higher VFA and NH_3N vs. Maize Silage
- HMBi did not affect rumen parameters measured suggesting a good degree of rumen protection

Acknowledgements

This research was funded under the National Development Plan through the Research Stimulus Fund administered by the Irish Department of Agriculture, Fisheries and Food

Additionally I would like to acknowledge the assistance of the farm and laboratory staff at UCD Lyons Research Farm

NDP
National Development Plan
Transforming Ireland

Department of
Agriculture, Fisheries and Food
An Roinn
Talmhaíochta, Iascaigh agus Bia

Thank you for your time

Your questions are welcome